



**Catalyst for Expanding Human Spaceflight**  
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# Vision

The vision of commercial human spaceflight to low-Earth orbit is a robust, vibrant enterprise **with many providers and a wide range of private and public users.**

A successful human space transportation system will strengthen the International Space Station Program, allow NASA to focus on deep-space exploration, potentially reduce the cost of human access to space and significantly contribute to the national economy.

Leading to:

## **CCP NASA Purpose**

Safe transport of NASA and NASA-sponsored astronauts to and from station.

## **CCP Public Purpose**

Support the development of non-NASA markets for commercial human transportation services to and from low-Earth orbit.





# Industries with Government Roots

Many commercial industries developed after significant technology development and operations by the government sector. Several examples include:

- Railroads
- Subsea
- Air Transport
- Communications
- Internet
- Launch Services
- Cargo Resupply for the International Space Station

# Commercial Airline Industry

## *A 20th Century Success Story*

### **Establishing the Need:**

- The government's initial need for aviation stemmed from military and airmail activities
- The post office later created minimal airmail routes

### **Laying the Ground Work:**

- Congress turned over airmail service to industry
  - Airmail volume increased dramatically and commercial air transport finally “took off”



# Commercial Airline Industry

## *A 20th Century Success Story*

### **Enabling Industry:**

- The government transitioned infrastructure to industry
  - Lighted airfields for night and weather operation
  - Provided radio equipment for weather information
- Post office paid industry based on weight and distance
- Government allowed industry to carry mail in any unused capacity
  - Reduced passenger expenses





# Commercial Airline Industry

## *A 20th Century Success Story*

### **Supporting Legal Framework:**

- The U.S. Air Commerce Act of 1926 established initial aviation regulations
- High-profile accidents revealed the need for uniform safety
- Following WWII, air travel became international
  - Industry asked for standardized operational and safety practices
  - The Chicago Convention in 1944 to establish international standards
    - That framework balanced industry's needs and public safety
      - Issued and enforced air traffic rules
      - Licensed pilots and certified aircraft
      - Established airways
      - Operated and maintained aids for air traffic control



# Commercial Human Spaceflight Industry

## *Writing a 21st Century Success Story*

- One of NASA's core missions is to advance the human exploration, use and development of space to benefit the quality of life on Earth
- Increasing the scale and diversity of commercial activity in space is essential to fulfilling this mission
- In 2010, NASA established a philosophy to engage and partner with the commercial aerospace industry to develop crew transportation systems (CTS) that would meet the agency's low-Earth orbit and International Space Station requirements and foster a new human spaceflight industry



# How Do We Do That?

Through an incremental, building block approach



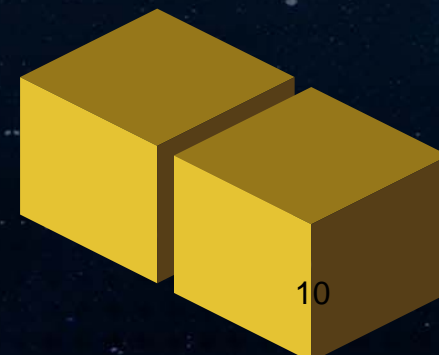
# Building Block 1: Establishing the Need

- In 2008, NASA began transitioning its cargo delivery capabilities to the American aerospace industry
- Now, we're encouraging the American aerospace industry to serve NASA's needs for station crew rotations and critical science
  - Ability to perform other low-Earth orbit missions
    - Crew transportation services
    - Powered scientific cargo
    - 210 days in orbit
- Transition space activities not involving inherently governmental functions to non-governmental organizations, allows NASA to focus on deep space
- We're looking to industry to meet our needs, thereby acting as a catalyst to propel commercial human spaceflight forward



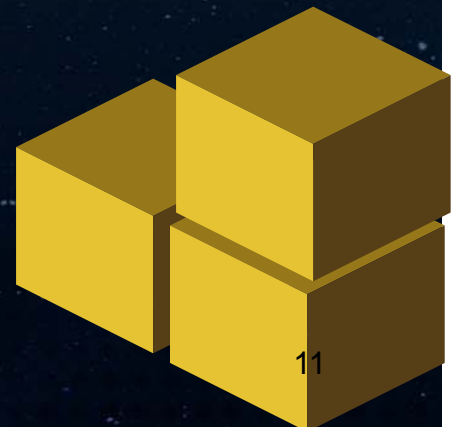
# Building Block 2: Laying the Groundwork

- We're providing 50 years of spaceflight knowledge
  - Transferring lessons learned from Apollo to today
  - Identifying what areas are critical for verification
- Establish and define partnerships with American aerospace industry
  - Initial space system designs
  - Collaborative technical interchange
- Balancing liability and risk posture to maintain competitiveness
- Spurring industry development
  - Space Act Agreements were used to invest in the development of subsystems, systems and then integrated space systems
  - Now, we're certifying integrated space systems and buying services
  - Although NASA is the anchor tenant, the development will spur future ideas and needs



# Building Block 3: Enabling Industry

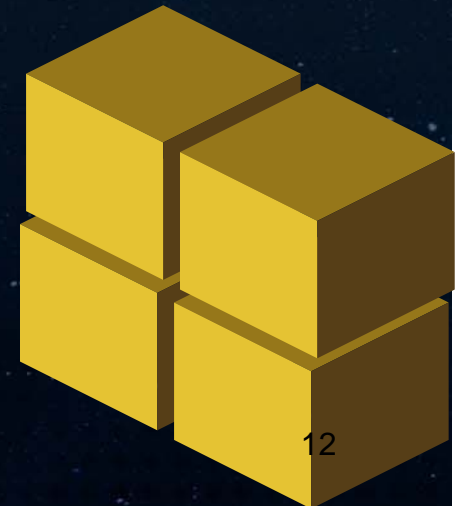
- Keeping mission-specific needs at a high-level
  - Balancing government and industry needs
  - Allows industry expand the business model for its system
- We're making infrastructure assets available for use by industry
  - Launch Pads, Processing Facilities, Mission and Launch Control Center, on-orbit communications, ground tracking
- Allow companies to retain intellectual property rights
  - Opens the door to sponsorships, partnerships and collaborations
  - Retains company value on investments





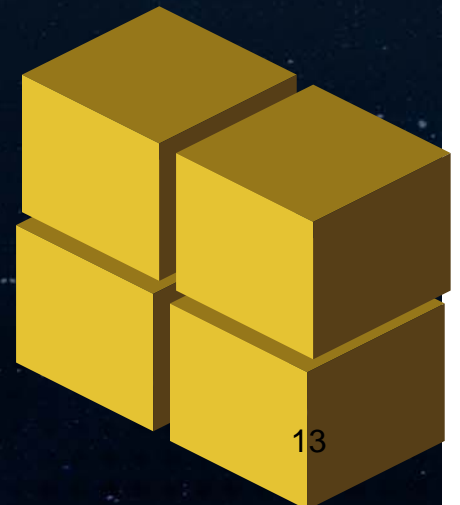
# Building Block 4: Legal Framework

- Historically the legal and regulatory framework has been responsive to industry development
- For NASA, the international community and industry to continue on a sustainable path, a legal framework is needed to enable industry to flourish safely, reliably and cost-effectively
  - Create a set of uniform industry standards
  - Define common terms, jurisdiction and adjudication
  - License missions
  - Accommodate civilian and commercial spaceflight transportation
- It will be hard and the risks are high, but there is a balance between how we enable industry without prohibiting it



# Building Block 4: Legal Framework

- Governments and regulators primary focus always remains public safety and welfare and protections for the common good
- Governments also have an interest in promoting new industries and markets to advance growth and prosperity
- Industry has an important stake in assisting governments by proactively developing safety regimes while remaining mindful of marketplace opportunities.
- Government and industry collaboration can more efficiently achieve transnational standardization and uniformity



# Going Forward

- We are on the cusp of a vibrant commercial space market
- NASA, through the Commercial Crew Program, will continue to be the catalyst for a vibrant and emerging commercial human spaceflight industry
- Industry will establish leadership in maturing the environment
  - Continue to perform and mature capabilities and markets
  - Collaborate for industry-wide standards
    - Uniformity and common interfaces
    - Self-adopted and governed
  - Engage and assist regulatory bodies to continue maturation of practices and regulations



# Summary



The Commercial Crew Program continues to execute its mission under the framework that was outlined in 2010. This allows industry to meet our critical needs, while providing a stepping stone to the future of commercial space.

